GAME 4 – Biological 1994 & 1995

Rus Brown has finished the "base" for Game 4.

This exercise will be the completion of Game 4, starting with 1994.

Game 4 still has AFRP actions incorporated into the baseline. July ramping will be included, etc.

Resources:

No water assets; debt of 50 KAF in San Luis; have purchased options for 4.8 million – need to call them in or the price will rise. Bank: $21 million. No water upstream.

Recap of 1993:

- Year began dry; storms in January and smaller storm in February.
- Used fish triggers to reduce exports early
- Let VAMP occur (5 wks); ramped up exports to full pumping in June and July.
- Start San Luis fairly full: 850 – 800 KAF in San Luis.

Baseline conditions

Baseline pumping fairly high; much water. Pumping to meet daily demand. Will be easy to repay the debt in San Luis, unless very aggressive restrictions are imposed.

Could start putting water into groundwater.

Pumping should be only 1,500 (pumping limit) for VAMP (second half of April; first half of May). Keep at 1,500 for the whole period.

N.B. Some measures (releases) were implemented, especially in Oct. and Nov. HOWEVER, water quality measures were not automatically incorporated into the base.

Extension of ramping is part of Delta Action 5, which is different from other games (esp. 5).

VAMP ramp for the last two weeks of May might be over-protective relative to what FWS would normally require.

Change the VAMP target to 3,200 cfs.

Need to go back and re-do the fall season of 1994 for Game 5 (starting in the second week in November).

October 93

- NO action.

November 93

- Close Cross Channel Gates (whole month)
- Chlorides good through the month

December 93

- *Export rate in base is about 7 kcfs due to a flow recession.*
- Action: maintain pumping at 7 kcfs for the entire month. Spring run yearlings and other similar-sized salmon migrating through the delta; action taken to improve in-delta conditions related to survival.
- Water cost for is 180 KAF for the month.
- Fish density in salvage is relatively low.
- Some excess outflow during small storms; MIGHT be able to back up some water. Feather river "deal" might be cut; Shasta is full (no opportunity). Not possible to back up any water.

January 94

- Exports: 11,354
- Outflow (surplus) 3,366; total outflow = 7,870
- E/I = 59%
- X2 = 80.5
- Base run: San Luis fills in the middle of January; with restrictions, San Luis debt would still be paid back, unless there would be further restrictions.
- Delta smelt densities rise by an order of magnitude during the month; chinook disappear.
- No need for salmon protection in January.
- EWA Decision: Put 20 KAF out of San Luis into Kern Water Bank. Would extend the debt in San Luis, but there is a probability of payback, and the Kern deposit would result in EWA collateral.

February 94

- Exports = 6,652 cfs
- Outflow = 25,416
- E/I = 21%
- X2 = 70.8
- San Luis is within 10 KAF of filling
- Could continue groundwater deposit into Kern unless there is a need for a fish action.
- No fish action needed; EWA action: Pass 20 KAF from the delta through San Luis into the Kern Water Bank.
- Chipps Is. Fish data: Delta smelt are abundant; other species present (incl. chinook).

March 94

- Exports = 5,511
- Outflow = 11,122
- E/I = 31%
- X2 = 74
- Fish densities are rising; assume that the salmon present are progeny of previous fall's winter run spawning.
- Fish Decision: Restrict pumping to 4 kcfs for the month of March. (Cost will be less since San Luis is nearly full, and will probably spill).
- EWA has options on 1100 KAF to spend on the San Joaquin side
- EWA cost is 60 KAF for restrictions in March.
- Add 2,000 cfs to SJR flow for the last 2 weeks of March.
- Use 60 KAF out of reservoir storage.
- Purchase 100 KAF in options, March. Release 60 KAF of this to increase SJR instream flows.
- Could back up 60 KAF in Folsum; there would be an instream flow consequence; could result in a stranding problem without appropriate ramping. Could go for about half of the amount, since the Folsum storage level is so low, and the streamflow situation is not good. Could adjust instream flow requirement to 1,000 cfs, moving 30 KAF back up into Folsum. This would be half of the EWA releases in the San Joaquin. EWA action: Do it.

April 94

- Exports = 2,873
- Outflow = 8,551
- E/I = 22%
- X2 = 77.1
- Could carry the VAMP flows through the first 2 weeks of April (2,000 cfs). Did augment SJ flows for the first two weeks by 2000. Reduced flow to VAMP flow of 3200. Rationale for going from 40000 to 3200 is because VAMP exports are 1,500 and there is an opportunity to "balance" flows against pumping rate.

May 94

- Exports = 2,115
- Outflow = 8,032
- E/I = 17%
- X2 = 78.5
- Large delta smelt spike.
- EWA owes about 10 KAF in the export area because of an automatic 50 KAF input.
- No action

June 94

- Exports =
- Outflow =
- E/I =
- X2 =
- EWA gain = 120 KAF through relaxation of E/I

July thru September 94

	July	August	September
- Exports =	5,873	11,874	7,930
- Outflow =	4,000	2,992	2,070
- E/I =	40%	65%	65%
- X2 =	88.2	88.7	89.9

- Export chlorides have been low but start up earlier; still below historic levels.
- No fish actions through September.

WATER YEAR 1995

October, November, December 94

- Exports = 5,000
- Outflow =
- E/I =
- X2 =
- Fish status: Very poor FMWT index for delta smelt. No salmon in Oct or Nov. Salmon show up in mid-December.
- Release American River water to downstream areas by watching weather and water temperatures (lower temperatures usually start in November). Jump to next AFRP step in November.
- Relax E/I in December? There is precedent. Do it for first week in December; 200 cfs for the month (average). Water consequence is a very small degradation in water quality (chlorides).
- Transfer 30 KAF into San Luis.

- Salmon (spring run yearlings; juvenile winter run) present in the delta in last two weeks of December: Reduce exports to 8,000 cfs for the second half (extend into and through January). Cost to EWA = 60,000.

January 95

- Exports =
- Outflow =
- E/I =
- X2 =
- Maintain export levels at 8,000 cfs through the month. Very low FMWT index for delta smelt in the previous fall; spring run and winter run salmon present.
- Oroville, Shasta, etc. getting quite full. All spill at the end of January.
- Exercise EWA and increase American River flows by 2,000 cfs (250 higher than AFRP) and extend through January. Add to EWA debt.
- Debt from Folsum releases is 250 cfs for about a week (240 KAF debt). Confidence that Folsum will spill.

February 95

- Exports = [*obtain from model*]
- Outflow =
- E/I =
- X2 =
- No action

March 95

- No action

April / May 95

- Fish status = salvage data is misleading this year, due to very low historic pumping.
- OK for first two weeks
- VAMP begins in week-3
- EWA debt = 107 KAF N.B. San Luis did not fill, so debt *not* eliminiated.
- Exports @ 3,000 cfs during VAMP in this scenario.
- No fish actions

June 95

- First week, exports at 3,000; second week exports at 4,500; third week at 6,000; fourth week at full pumping (12,500 cfs). Justification: late peak in outmigration of San Joaquin salmon outmigration.
- EWA cost = 330 KAF.
- About $40 million left in EWA bank.

July, Aug, Sep

- No action for fish
- Purchase 200 KAF in options from San Joaquin side for delivery next year.

Observation (Briggs).

We have assumed money and operations, and have actually made water quality gains without really any special effort...water quality "rides on top" of the game. Some additional water quality targets can be factored into the process for Quinn/Spear.

It will be interesting to see how demand patterns feed back into water quality targets.

N.B. Game 5, Nov. 1994. Inappropriate E/I relaxation. This will be "backed out" of the model run.

END